



Mississippi National River and Recreation Area

Sedimentary Layers

Grade levels: 4-6. Require time: 20 minutes initial activity, plus at least one day to observe.

Objective:

Create Sedimentary Strata. The students will utilize two types of sediment and water to create sedimentary layers as found in sedimentary rocks along the Mississippi River.

Materials:

1. Sand
2. Dried, powdered clay (available from art or pottery supply stores)
3. Water
4. Pint-sized jar (clear plastic or glass) with lid (students may bring in own jars in advance)
5. Measuring cups (to measure $\frac{1}{4}$ C. and 1 C.)

Introduction:

Show students a picture of the Grand Canyon. Ask students for ideas about how the layers (strata) might have been created. Tell them that similar layers can be seen along the Mississippi River between Minneapolis and St. Paul. This experiment can provide clues to how the strata were formed. Tell students that they are geologists.

Procedure:

- 1) Each student (or group of students) should place in their jar: $\frac{1}{4}$ cup sand and $\frac{1}{4}$ cup dry clay powder. Close lid and shake jar to mix sand and clay so that no layers are evident. (Students may want to mark their jar at this point to identify it as theirs.)
- 2) Add 1 cup of water. Close lid and shake jar again to mix contents.
- 3) Set aside, and do not disturb jar.
- 4) Observe contents after 15 min., 30 min., 1 hour, and 1 day. Record observations.
- 5) Discuss results and draw conclusions. (Why did the sand and clay form layers?)

Conclusions:

Given the results of the experiment, how do you think the strata of sedimentary rocks along the Mississippi River might have been formed? Are layers on the top formed before or after those under them?

Background for teacher: The ground in the Twin Cities is composed mainly of sedimentary rock layers (strata); these strata are exposed in many places along the Mississippi River. Sediment is particles of soil such as sand, silt, or clay that can be suspended (carried) in water. Sedimentary strata are layers of sediment compressed over time. Moving water can carry and sort sediment. How much sediment it can carry depends on the amount of movement (energy) in the water. When water movement slows, larger, heavier particles of suspended sediment (e.g. sand) will settle out first; when the movement slows more or stops, finer sediments (such as clay particles) will also settle. Sedimentary strata visible along the Mississippi River resulted from the rising and falling of tropical seas that covered Minnesota during the Ordovician period, from 500 million to 435 million years ago. These sedimentary deposits were hardened into rocks as a result of time and pressure. Sandstone deposits are evidence of sand beaches; shale (composed of fine clay particles) formed during a period of deeper, calmer seas. Geologists read sedimentary strata much as biologists read tree rings. The most recent strata are on top. The geology of the Mississippi River set the stage for the Twin Cities by causing larger riverboats to have to stop in St. Paul, and by creating waterpower opportunities at St. Anthony Falls.